Recall:

Parametric Form for Arc Length:
Let C be a **smooth** curve C, with x = f(t), y = g(t), C **does not intersect itself** on the interval a < t < b, except possibly at the endpoints, then the arc length of C on the interval is:

$$S = \int_a^b \sqrt{\left(\frac{dx}{dt}\right)^2 + \left(\frac{dy}{dt}\right)^2}\, dt = \int_a^b \sqrt{[f'(t)]^2 + [g'(t)]^2}\, dt$$

AP Calculus BC 2 Assignment 215 Tuesday, March 10, 2015 Hour Name

Parametrics

#'s 1-2: Find $\frac{dy}{dx}$

1. $x = t^2, y = 5 - 4t$

2. $x = \sin^2\theta, y = \cos^2\theta$

#'s 3-8: Find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ and find the slope and concavity (up or down) at the parameter value.

3. $x = 2t, y = 3t - 1, t = 3$

4. $x = t^2 + 3t + 2, \quad y = 2t, t = 0$

5. $x = t + 1, y = t^2 + 3t, t = -1$

6. $x = 2\cos\theta, y = 2\sin\theta, \theta = \frac{\pi}{4}$

7. $x = 2 + \sec\theta, y = 1 + 2\tan\theta, \theta = \frac{\pi}{6}$

8. $x = \cos^3\theta, y = \sin^3\theta, \theta = \frac{\pi}{4}$

#'s 9-13: Find all points (if any) of horizontal and vertical tangency to the curve.

9. $x = 1 - t, y = t^2$

10. $x = t + 1, y = t^2 + 3t$

11. $x = 1 - t, y = t^3 - 3t$

12. $x = 3\cos\theta, \quad y = 3\sin\theta$

13. $x = 4 + 2\cos\theta, \quad t = -1 + \sin\theta$

14. $x = 5\cos^3\theta, y = 5\sin^3\theta$ Find the arc length of the curve on the interval $[0, 2\pi]$